

Kerala Board Class 10 Physics 2015 Question Paper with Solutions

1. Select the instrument that works on the principle of multiple reflections of sound.

- a. Watthour meter
- b. Sonar
- c. Stethoscope
- d. Decibel meter

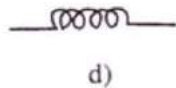
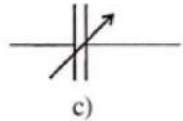
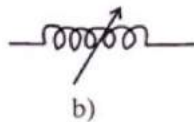
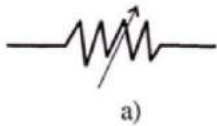
Answer: c) Stethoscope.

2. Study the relationship between the first pair and then complete the second pair.

Capacitance : Farad :: Resistivity : _____

Answer: ohm - meter ($\Omega \cdot m$)

3. Given below are the symbols of a few electric components. Which of these components denote a variable inductor?



Answer: Variable inductor is as shown in figure (b)

4. Which of the following describes ecliptic orbit?

- 1. Orbit travelled by the moon around the sun
- 2. The path travelled by the earth around the sun
- 3. Orbit along which sun appears to move among the stars
- 4. Orbit along which moon appears to move among the stars

Answer: b) Path travelled by the earth around the sun

5. When can an equilateral satellite be called a geostationary satellite?

Answer: Equatorial satellites revolve around the Earth along an orbit above the equator. Equatorial satellites can be called geostationary satellites if their period of revolution is equal to the period of the rotation of the Earth.

6. Match the items given in A suitably with the items given in B and C.

A	B	C
Microphone	Sonar	Electrical Energy gets converted to sound energy
Ultrasonic sound	Permanent Magnet	The sound energy gets converted to electrical energy
	Butane	Conventional source of energy
		Non-conventional source of energy
	Methane	The sound waves that are audible
CNG		Sound waves that are not audible

Answer:

A	B	C
Microphone	Permanent Magnet	The sound energy gets converted to Electrical Energy
Ultrasonic Sound	Sonar	Sound Waves that are Audible
CNG	Butane	Conventional Source of Energy

7. In the AC circuits, what is the advantage of using inductors instead of resistors?

Answer: The advantage of inductors is that the current flowing through it will not change instantaneously so that it can be used as a protection device for current transients. An inductor does not behave like a resistor and will oppose changes in the current flowing through them, by dropping the voltage directly proportional to the rate of change of current.

8. A motor rated 500W, 230 V utilises 3 units of electrical energy. Calculate the time for which the motor works.

Answer: Given that P (Power of the motor) = 500 W
E is the Energy utilised = 3 units = 3 kW /hour = 3000 W hr
Then Energy (E) = Pt
Therefore, $t = E / P = 3000 / 500 = 6$ hours
So, the motor works for 6 hours

9. Light energy is obtained in a fluorescent lamp and CFL as a result of electron emission. However, the process of electron emission is different in both cases. What is the difference?

Answer: In CFL, when the fast-moving electrons collide with the atoms of the mercury that is evaporated ultraviolet rays are produced. These invisible rays are then absorbed by the fluorescent material in the lamp and are then changed into visible light.

10. It is not safe to operate several electrical appliances simultaneously by using an adapter operating from a single point. Why?

Answer: When several electrical devices are simultaneously connected using an adapter operating from a single point, the sockets are connected in series in an adapter. Hence, when several electrical appliances are connected, the total current through the main wire may exceed the specified limit, thus resulting in overload. Thus, we can say that it is not safe to operate several electrical appliances simultaneously by using one adapter that is operating from a single point.

11. In a household electric circuit,

- a. Where is the MCB (Miniature Circuit Breaker) connected?**
- b. What is the function of ELCB (Earth Leakage Circuit Breaker)?**

Answer: a) MCB is a safety device that automatically switches off the circuit when there is any fault or overloading in the circuit. Like a fuse, the MCB is connected in series with the mainline in the household circuit. It is connected in series at the beginning of each phase in the circuit.

b) Meanwhile, ELCB is the safety device used during the installation of a household circuit that helps to identify even the small amount of voltage leakage to earth. On detecting the current leakage to the earth from the circuit, ELCB cuts off power, thus preventing the damage to humans and animals caused by the electric shock due to leakage.

12. A tuning fork is excited, and its stem is pressed on a wood table.

- 1. The table starts to vibrate. What is this type of vibration called?**
- 2. Under what condition, can resonance occur in this case?**

Answer: a) The vibration that the table undergoes when a tuning fork is excited, and its stem is pressed on a wood table is known as forced vibration.
b) Resonance takes place when the natural frequency and the forced frequency of the vibrating body (tuning fork) is equal.

13. What are the advantages of using armature as the stator in a power generator?

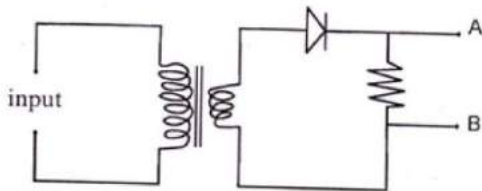
Answer: The advantage of using armature as the stator in a power generator is that it helps to eliminate the graphite brush and thus avoid sparks.

14. State what happens to the loudness of sound in the following cases:

1. The density of the medium increases
2. Distance between the source and the receiver increases

Answer: a) Loudness of the sound is directly proportional to the density of the medium through which it propagates. Hence, when the medium increases, the sound will be louder.
b) If the distance between the source and the receiver are less, then the sound heard by the listener will be more. So, if the source of sound is close, the sound heard will be louder.

15. A) A diode is connected to the output of a transformer, as shown in the figure given below. Analyse the figure.



- a. Draw a time voltage graph for the current obtained across AB
- b. What is the function of diode in the circuit?

Answer: a)



b) The diode functions as a rectifier in the circuit and allows only the positive voltage cycle to flow through the circuit, thus blocking the negative cycle.

15. B) When sound signals become amplified.

a. **What change can you observe in the amplified signals?**

b. **What remains unchanged in the sound signal even after the amplification?**

Answer: a) When the sound signals are amplified, the amplitude of the signals will also be larger, and so they will be louder than the original signal.

b) Meanwhile, even after the amplification of the sound signal, the frequency of the sound signal remains unchanged.

16. A blue flower appears blue in magenta light. In which other secondary light will the blue flower appear blue itself?

Answer: Cyan is a secondary colour of blue and green, so a blue flower will appear blue itself, in Cyan light.

17. Describe an experimental set up to show that sunlight can be split up into consistent colours and then convert it back to white light.

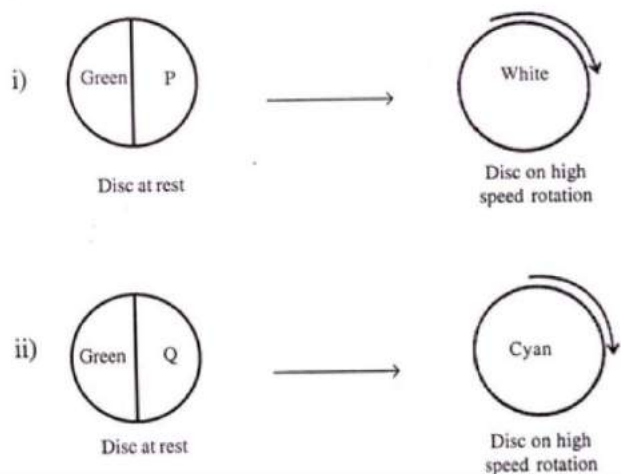
Answer: Using a prism, split the sunlight into its constituent colours. These can also be recombined to get white light again. For this, you can place an inverted prism beside the first one.

The steps for the experiment are given below:

1. **First, place a prism close to a window, with its base on a table.**
2. Then pass the sunlight via a slit onto the prism.
3. After that, observe the white light, which is split after passing through the prism.
4. Then, place another prism beside the first one with its base inverted with respect to the first one.
5. Now, observe the seven light rays that merge and form the white light after it is transferred via the second prism.

18 A) a) What do you mean by complementary colour?

b) Study the following figures and identify P and Q.



Answer: a) The pair of colours that combine with a primary colour to get a white light is known as Complimentary colours.

b) In figure (i) P is magenta. Because when magenta combines with green, it gives white colour.

Now, in figure (ii) Q is Blue, because when blue is mixed with green, it gives cyan colour.

18) B) a) Is it correct to say that only red colour is given out from the water droplets situated on the outer edge of the rainbow? Justify your answer.

b) Write a situation in which a rainbow can be viewed as a full circle instead of an arc.

Answer: a) Chandra is an x-ray telescope that operates in space and revolves around the earth. It picks up x-rays radiations and helps to study the universe.

b) The advantages of setting up a telescope outside the Earth's atmosphere is that the effects of absorption and refraction of the Earth's atmosphere can be eliminated. This helps in providing a clear observation of the universe. Apart from this, the atmosphere of the Earth also absorbs many parts of the electromagnetic spectrum such as the x-rays, infrared rays and more.

19. "Chandra" is a telescope operating in space to unveil the secrets of the universe.

a. Write the type of radiation that "Chandra" picks up to study the universe.

b. What are the advantages of setting up a telescope outside the Earth's atmosphere?

Answer: a) Chandra is an x-ray telescope that operates in space and revolves around the earth. It picks up x-rays radiations and helps to study the universe.

b) The advantages of setting up a telescope outside the Earth's atmosphere is that the effects of absorption and refraction of the Earth's atmosphere can be eliminated. This helps in providing a clear observation of the universe. Apart from this, the atmosphere of the Earth also absorbs many parts of the electromagnetic spectrum such as the x-rays, infrared rays and more.

20. Instead of using biomass directly as fuel, it is always advantageous to use biogas produced from biomass.

a. What do you mean by biomass?

b. What are the advantages of using biogas as fuel?

Answer: a) Biomass is the organic matter, the dead parts of the plants and the trees as well as the waste materials of animals used as a fuel to produce energy. Cow dung cake, dry leaves, firewood, animal excreta, vegetable wastes, and weeds are all examples of biomass. These are obtained from plants and animals are also called a renewable source of energy, as it can be produced again.

b) Find here the advantages of using biogas as fuel:

i. Biogas helps to dispose of the household wastes and biowastes in a useful and healthy manner.

ii. Reduces the use of wood and helps to prevent deforestation.

iii. Slurry from a biogas plant can be used as manure.

iv. It can be burnt without smoke and so do not cause air pollution.

v. Produce a large amount of heat per unit mass.

vi. It is a clean fuel and burns entirely without leaving any residue.

vii. Biogas is excellent domestic fuel, cheaper than most common fuels.

21. It is required to construct a transformer which gives 12 V from a 240V AC supply. The number of turns in the primary is 4800.

a. Calculate the number of turns in the secondary

b. State whether the coil in the secondary has to be thick or thin. Justify your answer.

Answer: a) The voltage generated by a transformer given as 12 V

And Number of turns in the primary coil = 4800

Now, given that V_s and N_s are the voltage and the number of turns of the secondary coil and V_p and N_p is the voltage and number of turns of the primary coil.

Calculate $V_s / V_p = N_s / N_p$

Therefore, $N_s = (V_s / V_p) \times N_p$

Meanwhile, here it is given that Given $V_s = 12V$ and $V_p = 240V$

Now If $N_p = 4800$, find $N_s = ?$

If we substitute the values we will get $N_s = (V_s / V_p) \times N_p = (12 / 240) \times 4800 = 240$ turns

Thus, the number of turns in the secondary coil is 240 turns.

b) Now take the example of the coil in the secondary. This has to be thick as it is a step-down transformer and in a step-down transformer, a thin wire is used in the primary coil, whereas thick wire is a secondary coil. The step-down transformer helps to change the high voltage AC (alternating current) to low-voltage AC. These transformers are also used to distribute electric power to homes.